A Good Pirate

The larger pirate bug could be a potent biocontrol in stored products.

A greedy pirate bug with an appetite for insects could help prevent damage to stored grain products.

In nature's bug-eat-bug world, predators could help balance the ratio of good bugs to bad.

The result could be smaller populations of all insects in stored products, with less reliance on insecticides, says ARS entomologist Thomas W. Phillips, formerly in the ARS Stored-Product Insects Research Unit at Madison, Wisconsin.

Although commonly called the larger pirate bug, *Lycotcoris campestris* isn't very big. Only about an eighth of an inch long and dark brown in color, it looks like a small stink bug or boxelder bug. However, the larger pirate bug can tackle a caterpillar 10 to 50 times its size.

Phillips and Megha N. Parajulee, a University of Wisconsin graduate student, were the first researchers to study the larger pirate bug as a potential predator of stored-product insects. Now an entomologist with Texas A&M University, Parajulee says the pirate bug in action "looks like a dog attacking an elephant."

Among its favorite prey are the larvae of Indianmeal moths, which commonly infest homes and commercial food warehouses. "They're responsible for large expenditures by the multi-billion-dollar food industry for sanitation and insecticidal treatments," says Phillips.

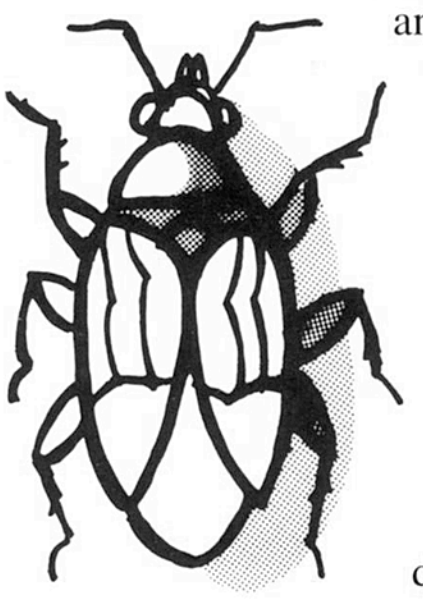
In addition to Indianmeal moths, *L. campestris* attacks and eats a varied menu, including Mediterranean flour moths, almond moths, red flour beetles, sawtooth grain beetles, and warehouse beetles.

"The pirate bugs are good guys, compared to the insect pests they devour. They don't get inside grain kernels nor do they eat the grain—only other insects. Their presence in warehouses and storage facilities represents no threat to the quality of the grain. When it's processed, the pirate bugs can be removed," says Phillips.

He and Parajulee began a 3-year study of the biology and behavior of the pirate bugs in the summer of 1991. The researchers had been sampling corn from Wisconsin farms when they found them in the samples. They began to see what the bugs would do against a range of stored-product insects.

Using its needlelike mouth parts, the pirate bug injects a venomous saliva that subdues its prey in less than a minute. Then the pirate bug sucks blood and body juices from its victim.

Although hundreds of species of pirate bugs exist, this one is important because it's found naturally in stored grain products. It's also been found feeding on insects in manure, under the bark of dead trees, and in haystacks, rotting leaves, matted-down grass, bird nests, poultry houses, and animal burrows.



In 1992 and 1993, the researchers studied the insect's behavior in a grain storage facility on a farm near Madison. Populations of the predator survived cold temperatures both on the farm and in laboratory studies.

Phillips says that "despite subfreezing temperatures, live bugs that were collected in the grain bin could feed on prey and reproduce as soon as they warmed up."

Phillips and Parajulee developed a method to rear a colony of the larger pirate bug in the laboratory. To study its food preferences, they paired it with 27 stored-product insects and 3 non-stored-product insects.

All but two of these pests (the tobacco hornworm and the yellow mealworm) died after meeting up with the pirate bug.

"The larger pirate bug is an ideal candidate as a biocontrol agent," says Phillips. "There's no special diet to prepare for rearing, so it could be easily adapted to commercial mass-production.

"Young pirate bugs are ready to feed on pests right after hatching. They live about 100 days when feeding on prey and can survive up to 20 days without food or water. That's important for a predator if it has to wait between prey hatchings."

Phillips and Parajulee recently teamed up with James Throne, an ARS entomologist formerly with the ARS Stored-Product Insects Research and Development Laboratory in Savannah, Georgia. He is now at the U.S. Grain Marketing Research Laboratory in Manhattan, Kansas. Together, they're developing a computer model to predict how predator populations increase under different environmental conditions. The model will help in planning strategies for using the larger pirate bug for biological control of stored grain pests.

"We recognize that insect pests can't be entirely eliminated with biological controls," says Phillips, "but by balancing the numbers of predators and pests, we can keep pest numbers at lower levels."—By **Linda Cooke,** ARS.

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